

REMARKS/ARGUMENTS

Re-examination and favorable reconsideration in light of the following comments are respectfully requested.

Claims 34 - 47 are pending in the application. Currently, all claims stand rejected.

In the office action mailed May 14, 2010, claims 34 -47 were rejected under 35 U.S.C. 112, second paragraph as being indefinite; claims 34 - 47 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,042,898 to Burns in view of JP 62139810 or JP 2003027209.

The foregoing rejections are traversed by the instant response.

With respect to the rejection under 35 U.S.C. 112, second paragraph, Applicants submit that there is nothing indefinite about the subject matter being claimed. Claims are to be read in light of the specification. The Examiner has not pointed out why when the claim is read in light of the specification one of ordinary skill in the art would not understand its meaning. The Examiner's comments about injecting gas where the workpieces are in the furnace chamber reading on treating the entire or any portion of the furnace chamber is wrong. The claim says that the cleaning gas is to be injected only at a center of an area where the at least one workpiece is to be located. One of ordinary skill in the art would know the area where the workpiece or workpieces is to be located and would know where the center of the area is. The Examiner is requested to withdraw the rejection.

Independent claim 34 is directed to a method for heat treating at least one workpiece comprising the steps of: cleaning a furnace chamber to be used during said heat treating method; said cleaning step being performed without said at least one workpiece being present in said furnace chamber; said cleaning step comprising introducing a cleaning gas into the furnace chamber only at a center of an area where the at least one workpiece is to be located; said injecting step comprising injecting said gas at a partial pressure and a flow rate sufficient to create a pressure differential within said furnace chamber which carries contaminants away from said center of an area where the at least one workpiece is to be located and toward an exit of said furnace chamber; said cleaning step further comprising heating said furnace chamber at a temperature which is 200 to 300 degrees Fahrenheit above a temperature to be used in a subsequent diffusion heat treating step for at least 30 minutes; and after said cleaning step has been completed, placing said at least one workpiece within said cleaned chamber and diffusion heat treating said at least one workpiece in a gas atmosphere with said gas being introduced into the furnace chamber only at said center of an area in said furnace chamber where the at least one workpiece is to be located.

As discussed in prior responses, Applicants have found that significant improvements can be made in heat treating coated workpieces by first cleaning the chamber in which the workpieces are to be placed in a way which moves contaminants away from the area in which the workpieces are to be located. To this end, Applicants perform the cleaning process by injecting a gas into the furnace chamber *only* at a center of the area where the at least one workpiece is to be located. This is illustrated in Figure 1 of the instant application. The gas, which is

introduced solely at this location, is introduced at a partial pressure and a flow rate sufficient to create a pressure differential which carries contaminants away from said center and toward an exit of said furnace chamber. After cleaning has been completed, the at least one workpiece is placed in the cleaned chamber and subjected to a diffusion heat treatment where again the gas which is injected into the chamber is injected only at said center.

The improvements in the treated workpieces can be seen from Figures 2 to 4 in the application. Figure 2 illustrates a workpiece with an as deposited and diffused coating. Figure 3 illustrates a coating which has been formed using the method described herein and which was surface finished by shot peening. As can be seen from Figure 3, the coating is free of pores, voids, and other bad features. In fact, the coating is homogeneous and has very good ductility. Figure 4 illustrates a coating which was not formed using the clean furnace and heat diffusion treatment of the present invention. As can be seen from Figure 4, the coating has voids and fissures which makes it quite brittle.

In the May 14, 2010 office action, claims 34 - 47 were again been rejected as being unpatentable over U.S. Patent No. 6,042,898 to Burns et al. in view of JP 6219810 or JP 2003027209. It is believed that these references do not render the subject matter of claim 34 obvious. Burns et al. is directed to a method for applying improved durability thermal barrier coatings. During the processing of the coated article in Burns et al., undesired oxides and contaminants are removed from a bond coat with an ionized gas stream cleaning process,

such as a reverse transfer arc process. See column 3, line 33 to column 4, line 23 of Burns et al. Clearly, Burns et al. requires that the blade (2) to be cleaned be present in the vacuum chamber. This portion of Burns et al. is not describing the claimed technique for cleaning a furnace chamber prior to performing a diffusion heat treating step. Burns et al. is directed to cleaning a particular coating applied to an article. In other words, the article is already in the chamber during the cleaning operation. In contrast, Applicants are cleaning the chamber without any article or workpiece being present. This is now clearly spelled out in amended claim 34. Further, there is no disclosure in Burns et al. of injecting the gas used to remove the contaminants only at the center of the location where the workpieces are to be placed. Still further, there is no disclosure in Burns et al. of placing said at least one workpiece within said chamber after said cleaning step has been performed and diffusion heat treating said at least one workpiece in a gas atmosphere with said gas being injected only at said center of the area where the at least one workpiece is located.

The two Japanese patent documents do not cure these deficiencies in Burns et al. JP 62139810 relates to a method and apparatus for cleaning the interior of a tempering furnace. There is no disclosure of injecting a gas into the furnace only at the center of the location where workpieces are to be placed and there is no disclosure of injecting the gas at a partial pressure and a flow rate sufficient to create a pressure differential which carries contaminants away from said center and toward an exit of said furnace chamber. JP 2003027209 relates to a surface hardening treatment method for deep hole of

parts in vacuum furnace. Here again, there is no disclosure of injecting a gas only at the center of the location where workpieces are to be placed and there is no disclosure of injecting the gas at a partial pressure and a flow rate sufficient to create a pressure differential which carries contaminants away from said center and toward an exit of said furnace chamber.

Still further, neither Japanese reference discloses the step of after said cleaning step has been completed, placing said at least one workpiece within said cleaned chamber and diffusion heat treating said at least one workpiece in a gas atmosphere with said gas being injected only at said center.

For these reasons, the subject matter of amended claim 34 is not rendered obvious by the combination of references.

Claims 35 - 47 are allowable for the same reasons as their parent claims as well as on their own accord.

With regard to the Examiner's comments on page 4 about cleaning a furnace chamber before heat treatment steps being within ambit of ordinary skill artisan in order to avoid contaminating workpiece, the Examiner fails to grasp that he must do more than say it is within the ambit of one of skill in the art. Citing a reference to establish this point is what is required unless the Examiner intends to submit a declaration on this point.

As for arguing the point that the cleaning gas can be introduced anywhere in the furnace chamber, the Examiner is wrong. The claim calls for it being introduced into only the

center of the area where the workpieces are to be located. The Examiner has not shown a reference which shows this. Further, even if the workpieces can be placed in any area within the furnace, the claim still requires the gas to be introduced only in the center of the area.

As to Figures 2 to 4, if the Examiner is going to question the existence of the improvements, then the Examiner should present a reason why he believes that no improvements are present in Figures 2 to 4. Failing that, the Examiner should concede that improvements exists. The measurable data is in the Figures. As to what made the improvement, the Examiner should read the specification which explains what made the improvement.

As for the claimed flow rate, Applicants do not have to show criticality until the Examiner makes out a prima facie case of obviousness. The Examiner has not done that with respect to the invention in general and to the claimed flow rates. Again the Examiner makes an assumption that one of skill in the art would know how to manipulate the flow rate. Assumptions are not a substitute for evidence. The Examiner is requested to provide evidence that one of skill would know how to do that. Failing that the Examiner should withdraw the rejection.

For the foregoing reasons, the instant application is believed to be in condition for allowance. Such allowance is respectfully solicited.

Should the Examiner believe an additional amendment is needed to place the case in condition for allowance, he is hereby invited to contact Applicants' Attorney at the telephone number listed below.

No fee is believed to be due as a result of this response.
Should the Director determine that a fee is due, he is hereby
authorized to charge said fee to Deposit Account No. 21-0279.

Respectfully submitted,

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